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A NEW AND UNUSUAL LOWER JURASSIC CIRRIPED FROM OSTENO IN LOMBARDY: *OSTENIA CYPRIFORMIS* N. G. N. SP.

(Preliminary note)

Abstract. — *Ostenia cypriformis*, a new genus and new species of the Lower Sinemurian from Osteno in Lombardy, is described. It is an arthropod with unusual characteristics, with an anatomical organisation recalling that of the cirripeds.

In the authors' opinion the adult specimens of the species in question manifest characteristics, mixed together, that are found in the *cypris* stage of the *Thoracica* and *Rhizocephala* and in the adult stage of the *Ascothoracica* and *Thoracica*.

It cannot be excluded that *Ostenia cypriformis* may constitute an high systematic category of cirripeds hitherto unknown.

Riassunto. — *Un nuovo inusuale cirripede del Giurassico inferiore di Osteno in Lombardia*: Ostenia cypriformis *n. gen. n. sp.*. (*Nota preliminare*).

Viene descritta *Ostenia cypriformis*, nuovo genere e nuova specie del Sinemuriano inferiore di Osteno in Lombardia. Si tratta di un artropode dalle caratteristiche insolite, la cui organizzazione anatomica ricorda quella dei cirripedi.

Gli autori sono del parere che negli esemplari adulti della specie in questione siano presenti, mescolati assieme, caratteri che si rinvengono nello stadio *cypris* dei *Thoracica* e dei *Rhizocephala* e nello stadio adulto degli *Ascothoracica* e dei *Thoracica*.

Non si esclude la possibilità che *Ostenia cypriformis* rappresenti una alta categoria sistematica di cirripedi fino ad ora ignota.

Among the organisms that are found in the Sinemurian deposit at Osteno on Lake Lugano (¹), there are very frequent remains of a crustacean of ununsual appearance. Such remains are generally fragmentary

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(¹) The Sinemurian deposit of Osteno, situated on the eastern bank of Lake Lugano in the province of Como, was discovered in 1965 (PINNA 1967). In it numerous organisms have been found: plants, fishes, cephalopods, echinoderms, worms of various types and numerous different crustaceans. From this material the erionidean crustaceans (PINNA 1968, 1969) and a cephalopod with traces of soft parts (PINNA 1972) have so far been published.

and, precisely because of their incompleteness, constitute a problem by no means easy to solve.

Most of the remains in question are in fact chitinous carapaces with dimensions ranging from 15 to 200 mm in length, and all of them, despite the different dimensions, having a similar morphology. These chitinous carapaces have no very evident features; they have a characteristic form in lateral view, they are superficially smooth, probably very thin, and on the lower margin present a trace that was initially interpreted as a muscular insertion, while some of them are accompanied forward and backward by two perfectly flat elliptical impressions situated in continuity with the edges of the carapace.

These features, observed in the first specimens discovered, were naturally too few to allow any exact determination of the organism.

A number of new specimens, recently discovered by private researchers (2), present new details which now enable a more accurate analysis to be made. In the new specimens articulated appendices have in fact been identified, probable ovary has been observed, and the structures responsible for the anterior and posterior elliptical impressions have been discovered in position.

These new features have allowed it to be shown that the organic remains in question, undoubtedly arthropods in view of the presence of articulated appendices and a chitinous carapace, have an organisation comparable in the main to those of the cirriped crustaceans.

In the Osteno deposit more then 150 specimens attributable to this curious crustacean have so far been discovered; a considerable number justifying some attention to a form of which there is no trace in zoological and palaeontological literature, except perhaps for some references that will be discussed below.

The anatomy of the animal in question is quite unusual and this gives reason to suppose that, while still within the framework of the *Cirripedia* class, it belongs to an high systematic category hitherto unknown. On the basis of these premises, we feel we should propose a preliminary description of the animal, even though analysis of the specimens is far from being completed, and that we should at the same time propose a new systematic entity for it.

It should lastly be borne in mind that, like any other organism originating from the Osteno deposit, all the specimens attributed to the new species have undergone strong compression during fossilisation. They are therefore reduced to a thin lamina not easy to prepare and, since an extensive chitinous carapace enveloped a good part of the animal's body, this is difficult to observe and hence to reconstruct.

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(2) The researches in question are Messrs. D. Briata, J. Caneva and G. Maini; we express our liveliest thanks to them for their precious cooperation.

Class CIRRIPEDIA Burmeister, 1834
Order undetermined

Genus **Ostenia** nov.

Etymology: from Osteno (Como), place of discovery.
Type species: *Ostenia cypriformis* n. sp.
Description: coinciding with that of type species.

Ostenia cypriformis n. sp.

Etymology: from the characteristics typical of the *cypris* stage presented by the animal.
Holotype: spec. nº i 741, Milan Civic Natural History Museum Collection.
Paratypes: specs. nº i 742 - i 743 - i 744 - i 745 - i 746 - i 747 - i 748 - i 749 - i 750, Milan Civic Natural History Museum Collection.
Place of discovery: Osteno (Como).
Geological age: Lower Sinemurian, *bucklandi-zone.*

Description.

The specimens examined can, where dimensions are concerned, be divided into three groups corresponding to three successive growth stages (³):

Large specimens		
	length of carapace	145 to 200 mm
	height of carapace	70 to 90 mm
Medium specimens		
	length of carapace	35 to 50 mm
	height of carapace	18 to 30 mm
Small specimens		
	length of carapace	15 to 29 mm
	height of carapace	7 to 13 mm

(³) Length of the carapace, measured in lateral norm, is defined as the straight line distance joining the anterior end to the posterior end of the carinal edge. The height of the carapace is measured perpendicularly to the foregoing, starting from the rostral end of the anterior edge.

The morphological differences found between specimens of different sizes are on the whole small, even though constant. The general morphological homogeneity between small and large specimens thus indicates that even the smaller-sized representatives of the fauna had reached the adult stage.

The species *Ostenia cypriformis* is in general characterised by two easily identified elements: a chitinous carapace, and a body largely contained in the cavity of such carapace.

The carapace is the most resistant part, which has been best preserved in the fossil state. It is a univalve chitinous structure, very thin on the whole, in which three different regions can be observed: two lateral areas (right and left) and a central carinal area. These are of different consistence and are joined together without any break in continuity; the lateral areas are separated from the carinal area, which is stronger, by two thin lateral carinae running from front to back, almost parallel to the median line of the carapace, along which median line the carapace itself folds on both sides, forming in its interior the cavity in which a good part of the animal's body is contained. This accentuated folding of the carapace has meant that all specimens, except for two or three samples, are fossilised in lateral norm with the edges of the lateral areas almost always perfectly superimposed.

In the large specimens the greater consistence of the carinal area is evident, which is not always the case in the medium and small specimens. To judge from some slightly distorted samples, the folding of the carapace did not occur suddenly, i.e. the fold area did not, at least in the larger specimens, form an acute angle: it seems on the other hand that along the entire back of the carapace the carinal area was flattened and contained a carinal groove accompanied by two lateral parallel ridges.

In lateral view the carapace has a roughly trapezoidal form in all specimens, irrespective of size: it is thus possible, partly on the basis of the terminology used for cirripeds, to distinguish a carinal (or dorsal) edge that is convex with a large curvature, a concave anterior (or cranial) margin, linked to the former in such a way as to make a very accentuated projection, a posterior (or apical) margin of limited extent, and a rostral (or ventral) margin. The last starts from the apical margin obliquely in relation to the front-back direction of the carapace and then becomes parallel to the carenal margin, forming an angle of about 140°, and thereafter joining the anterior margin with an obtuse angle. The anterior, apical and rostral margins are open.

The carapace surface is smooth. On each side it has the longitudinal carina separating the lateral area from the carinal area, and situated at about the upper 4th of the side of the carapace, as well as an oval or subcircular swelling, surrounded by a groove, situated close to the rostral margin, at about the middle of its anterior tract. This swelling is not evident in the larger forms, perhaps due to attenuation as a result of thickening of the carapace. It is thought to be the impression of the adductor muscle.

The edges of the carapace are bordered with a strong and continuous marginal carina.

The animal's body is not visible *in toto* in some specimens. Its structure and form are evident in the large types, while it is not preserved or, more rarely, is preserved to only a quite fragmentary extent, or only its negative impressions are retained on the rock (only for the parts emerging from the carapace) in the medium and small specimens.

The body of *Ostenia cypriformis* offers few diagnostic features, but great constancy of form in all specimens; the original low resistance to

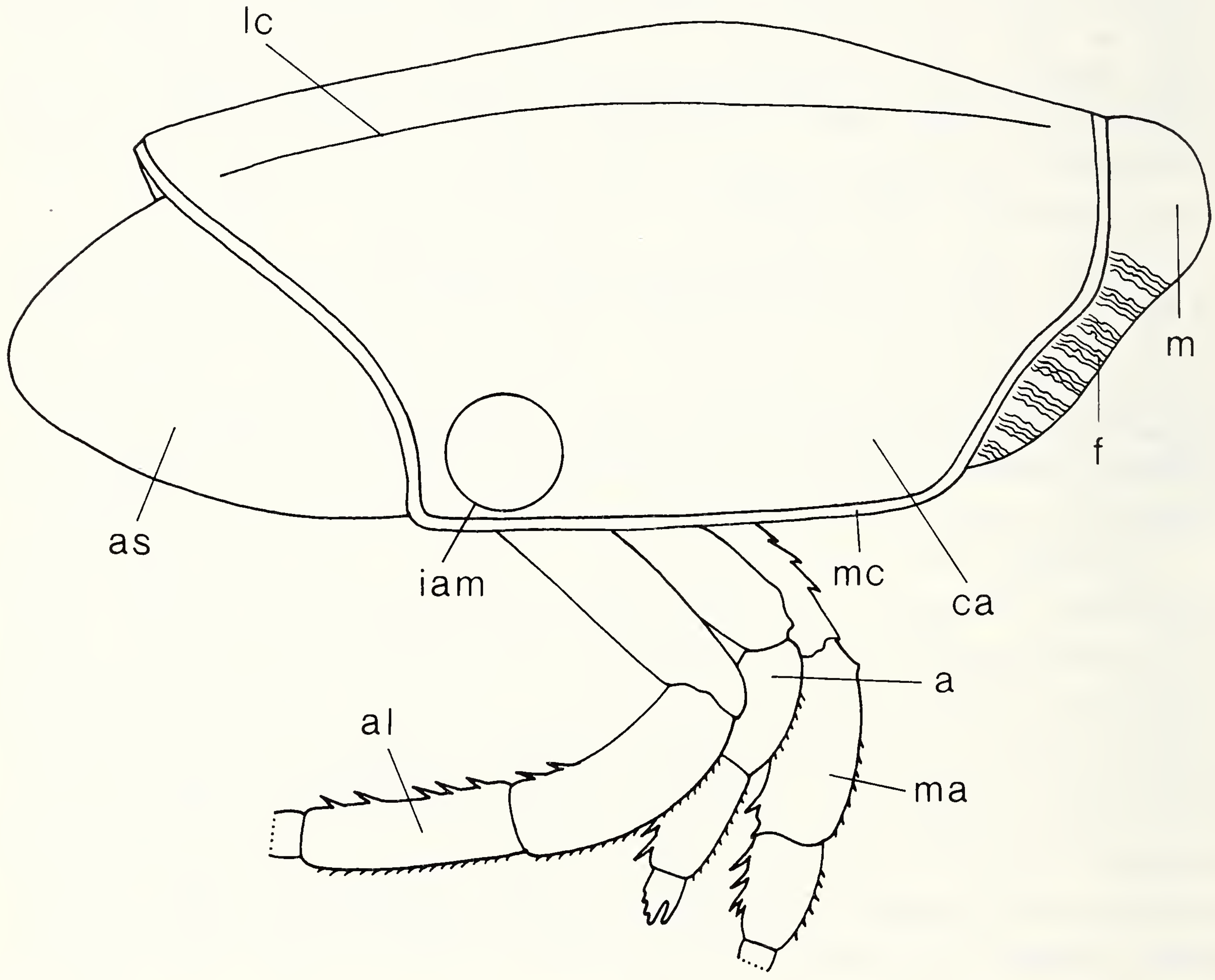


Fig. 1. — *Ostenia cypriformis n.g.n.sp.*, hypotetical reconstruction of the animal.
a = second antennae, al = antennulae, as = anterior sac, ca = carapace, f = filaments, i am = impression of the adductor muscle, lc = lateral carina, m = mantle, ma = mandible, mc = marginal carina.

fossilisation of some of its parts, probably not very consistent at the start, is the reason for its fragmentation. In the specimens in the best conditions of preservation it is however possible to note a structure which, in the absence of other terms of comparison, we have compared with the general organisation of the cirripeds.

The body of *Ostenia cypriformis* projects from the chitinous carapace at the two ends: cranially in a mass of constantly elliptical form, with well-defined margins and structure; at the back in a smaller and badly preserved structure. From the carapace, along the linear tract of the lower margin (in the larger specimens only) there are three projecting pairs of articulated appendices of considerable length, and along the oblique tract of the lower margin a series of short non-septate appendices, which are apparently filamentous and of reduced length.

While the portions of body projecting from the carapace at the front and back are the most evident, the part covered by the carapace is rather evanescent, although not homogeneous.

We based orientation of the carapace on analogy with the cirripeds: in particular, on the position of the mass we have defined as anterior, which is comparable to the peduncle in cirripeds, and on the presence at the opposite end of a segmented structure comparable to the *thorax* of a cirriped at the *cypris* stage.

At the front the animal's body is thus formed of an elliptical mass projecting from the carapace along the whole of its anterior margin. It is probably a hollow structure, a kind of sac, with a wall composed of at least two principal levels of different structure: A) a superficial level (or a series of levels in repeated succession: the exact organisation is not clear) with outer surface of small hexagonal cells, and inner structure crossed vertically by numerous rods; B) a level without any rod structure and crossed by numerous muscular bands intersecting at different angles.

Inside such hollow anterior sac there is a circular structure (probably spherical to begin with) appearing black in the fossil and containing a large number of hollow spheres, with a fairly thick wall, having a diameter not exceeding 6/10 of a mm. This structure, situated in a central position in relation to the cavity of the sac, at the front edge of the carapace, is thought to be the ovary.

The organisation of the portion of body behind the anterior sac and ovarian sac is not clear and there are few evident features. Under the carapace, towards the carenal margin, there is a narrow, elongated muscular bundle consisting of a large number of parallel fibres. This bundle follows the longitudinal carina and seems to connect the front sac to the posterior external protuberance; it is interpreted as the retractor muscle.

Below this muscular fascia there is a striated structure interpreted as the oesophagus. Underneath this, close to the ventral margin, corresponding to the circular impression on the carapace, a structure formed of bundles of fibres in a radial arrangement can be observed (adductor muscle).

In the animal's hind part the body has a segmented structure. From 8 to 10 narrow and elongated segments (the number is not certain), arranged perpendicularly to the oblique tract ot the ventral margin and inclined about 140-150° to the longitudinal axis of the carapace, can be observed. These segments have a trend similar to that of the pedicels of the thoracic appendages in cirripeds. It seems that, at the level of each segment, a well-defined distal bundle of filaments projects from the carapace along the oblique tract of the ventral margin; the filaments form a series of 8-10 appendicular bundles. In one specimen only it seems that at the proximal end of each segment there is another filamentous appendage, which runs towards the carinal region. These are interpreted as gills.

All this segmented part of the body has a structure that is anything but clear: the distal bundles of filaments do not in fact have the appearance of cirri, and in some specimens they seem to be enveloped in a

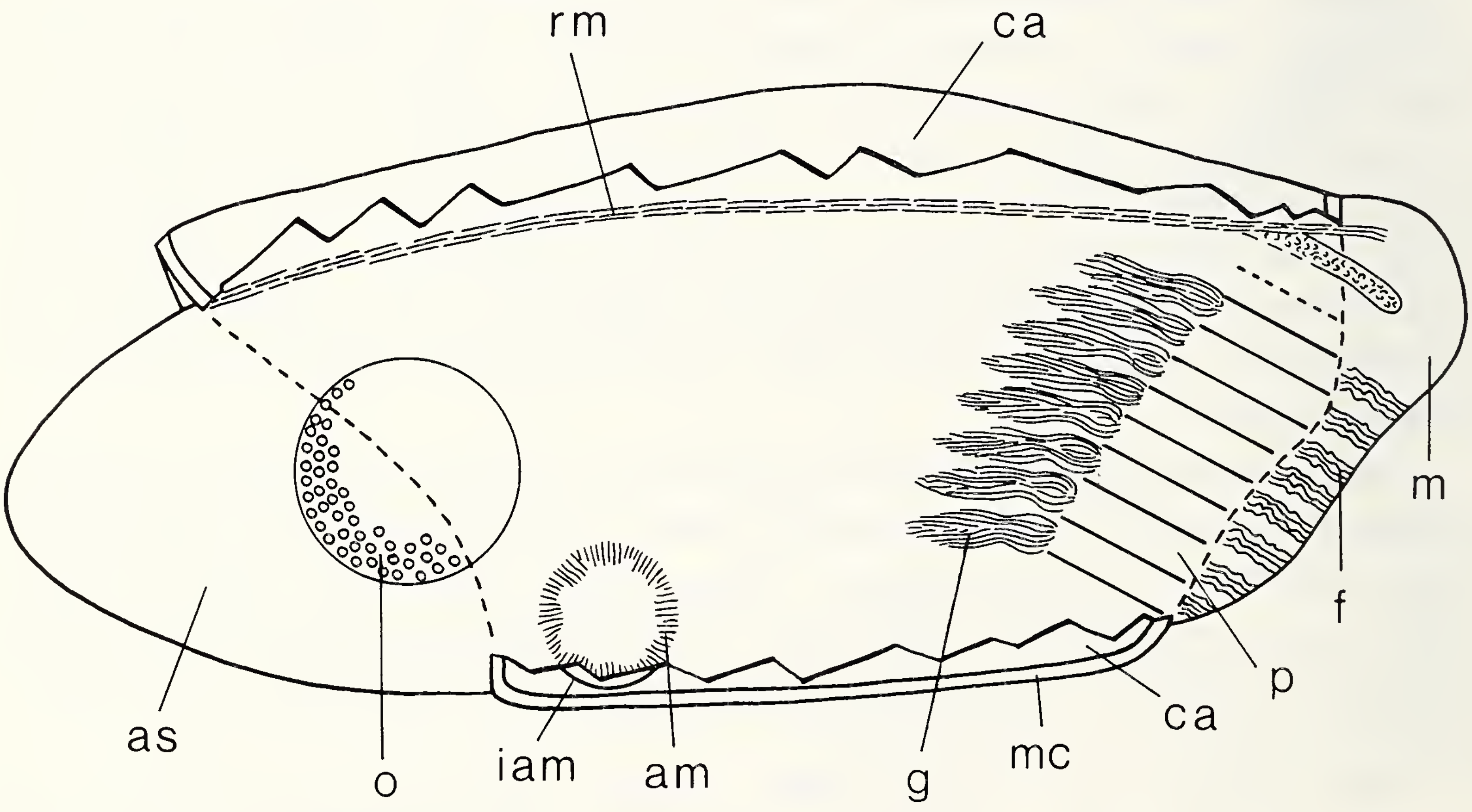
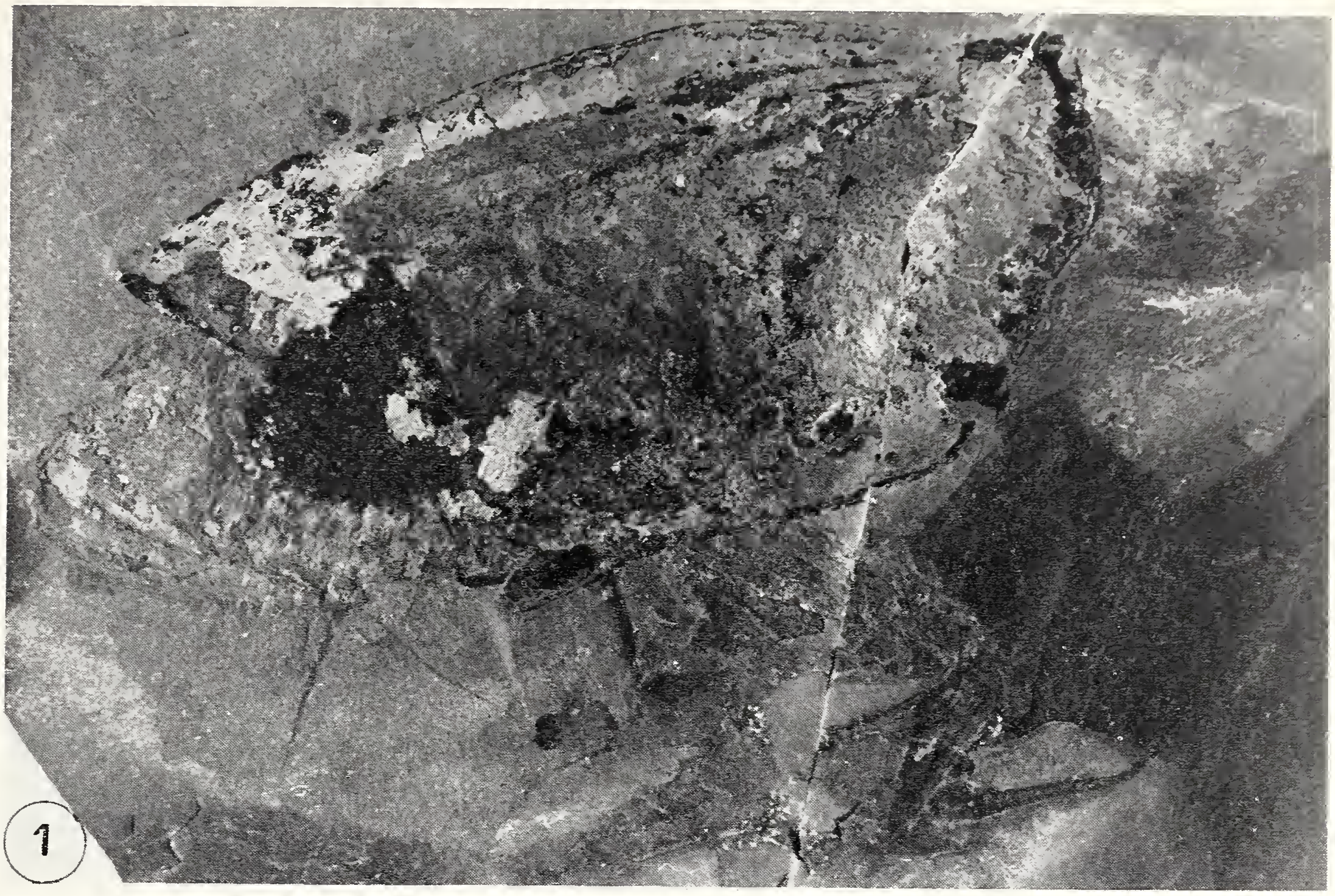


Fig. 2. — *Ostenia cypriformis n.g.n.sp.*, reconstruction of some internal structures, carapace in part removed.

am = adductor muscle, as = anterior sac, ca = carapace, f = filaments, g = gills, i am = impression of the adductor muscle, m = mantle, mc = marginal carina, o = ovary, p = pedicels, rm = retractor muscle.



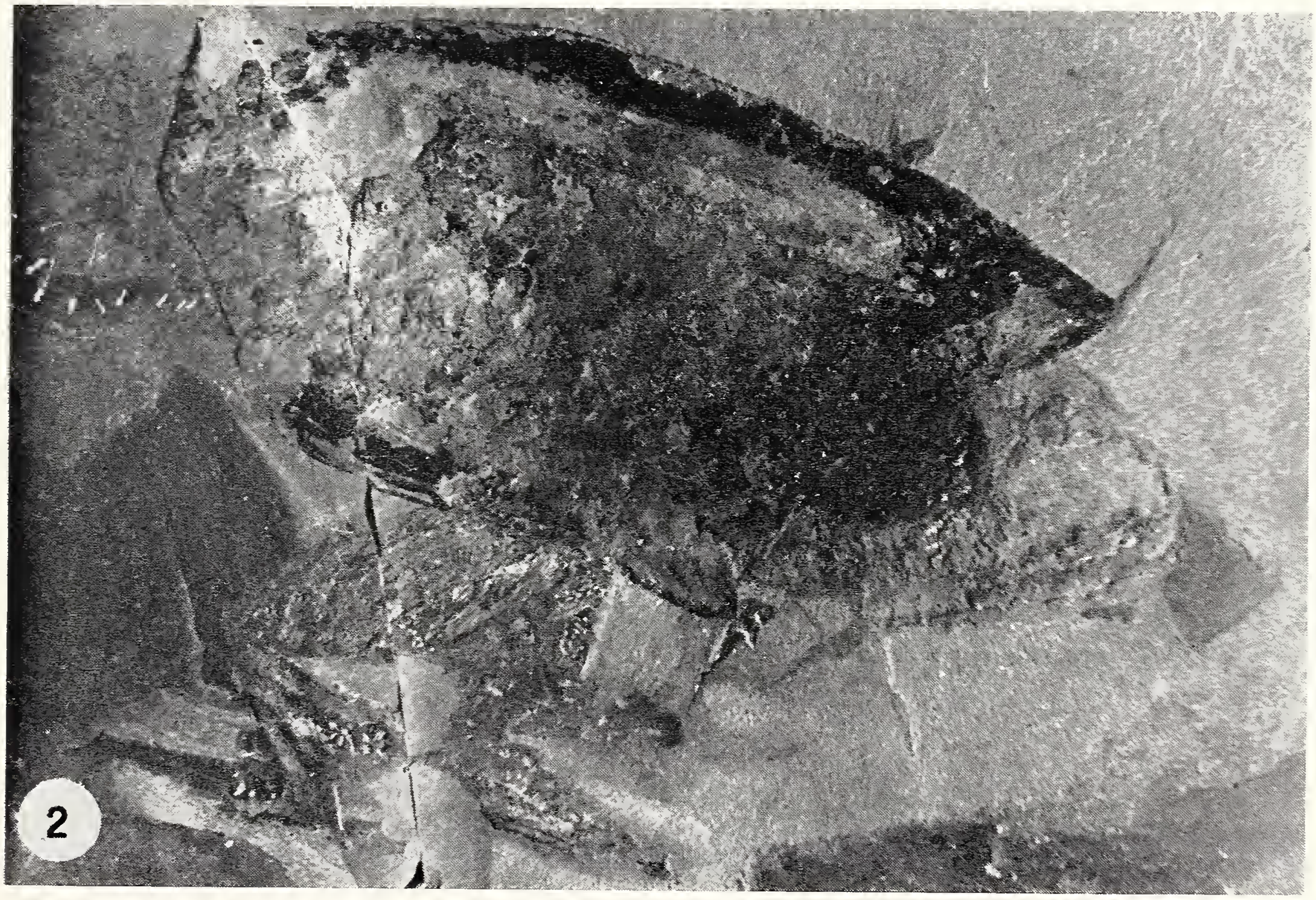


Fig. 1. — *Ostenia cypriformis*. Olotype, nearly complete large specimen. N° cat. i 741 (× 0,6).

Fig. 2. — *Ostenia cypriformis*. Olotype, same specimen, counterpart. N° cat. i 741 (× 0,6).

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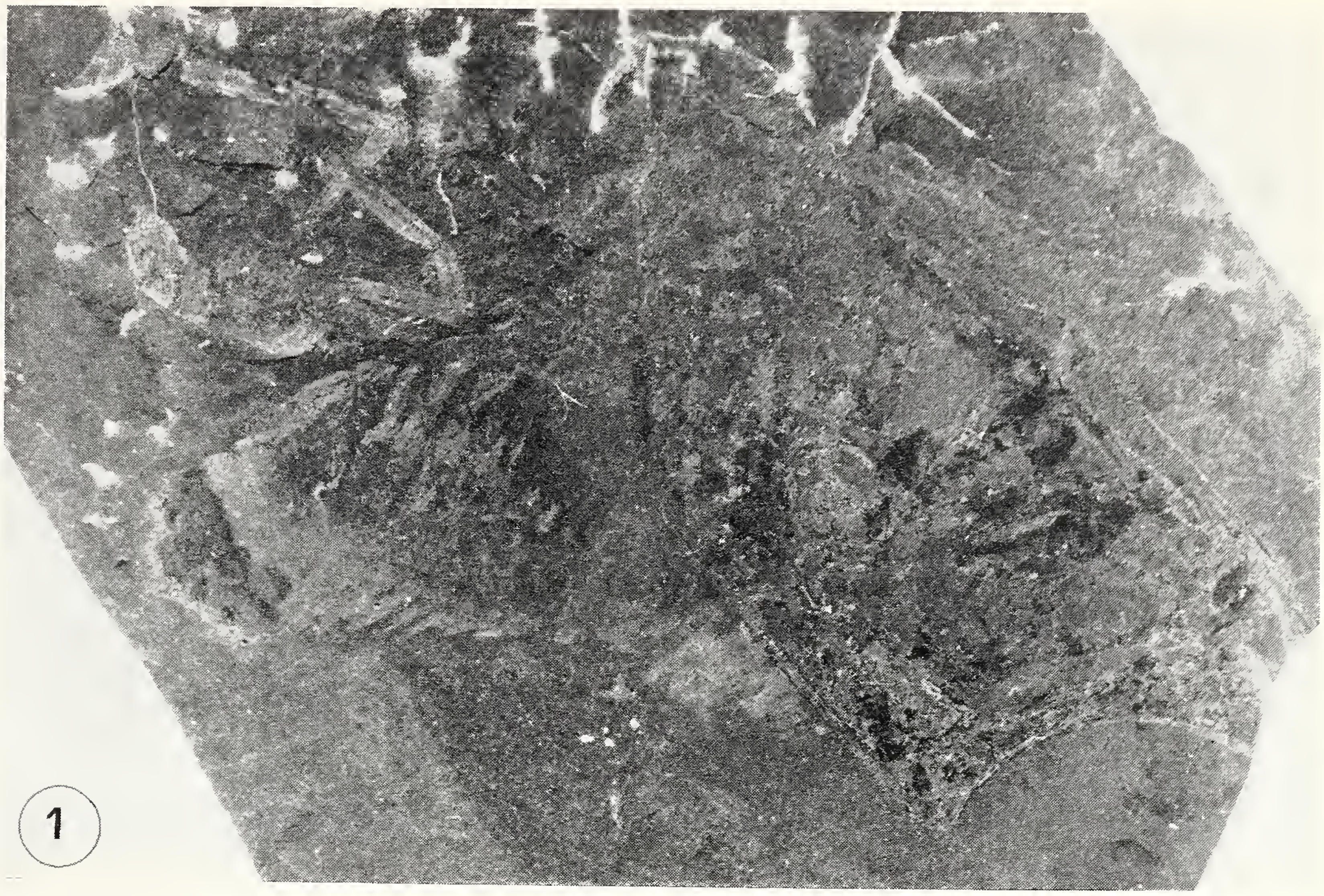

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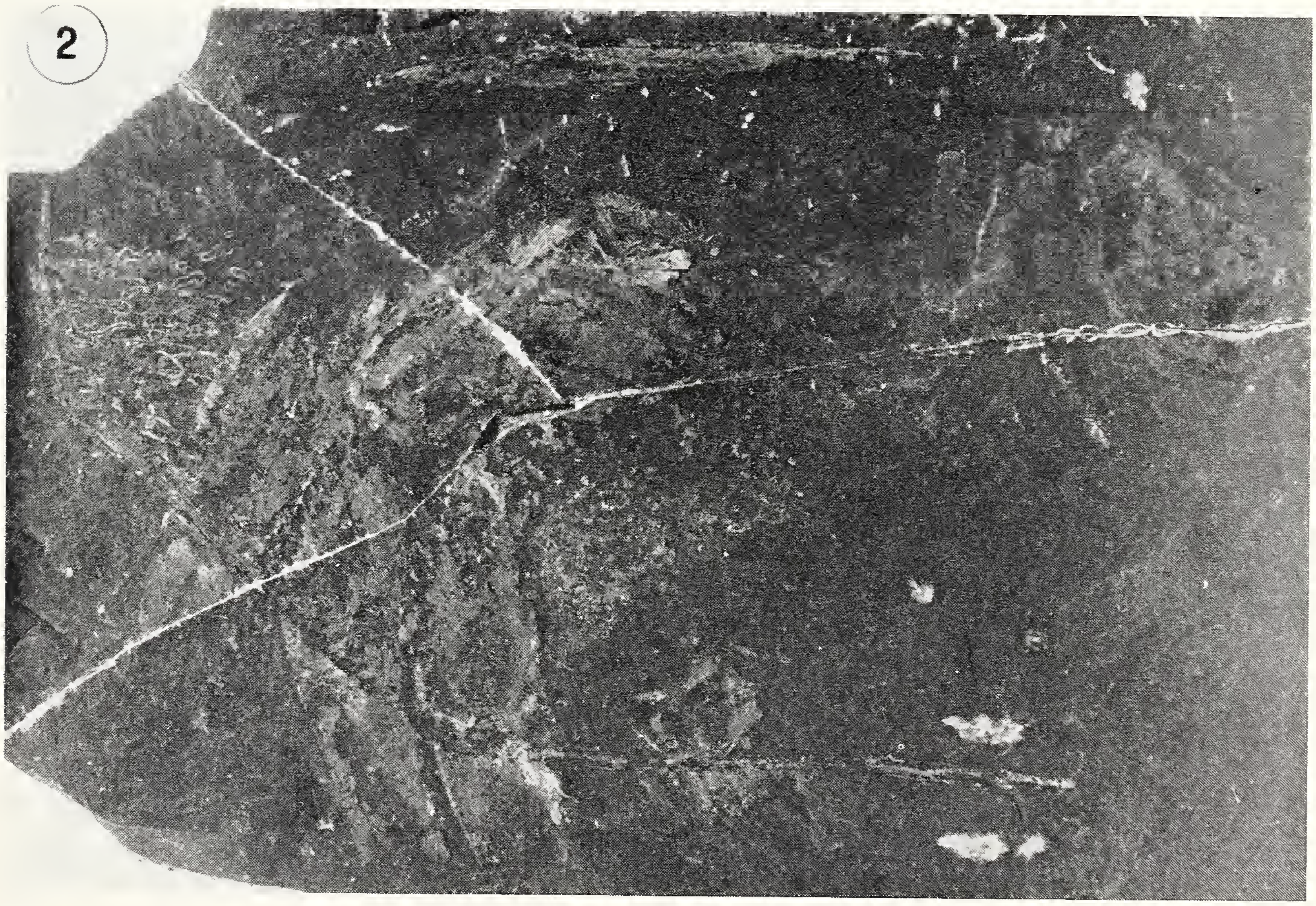
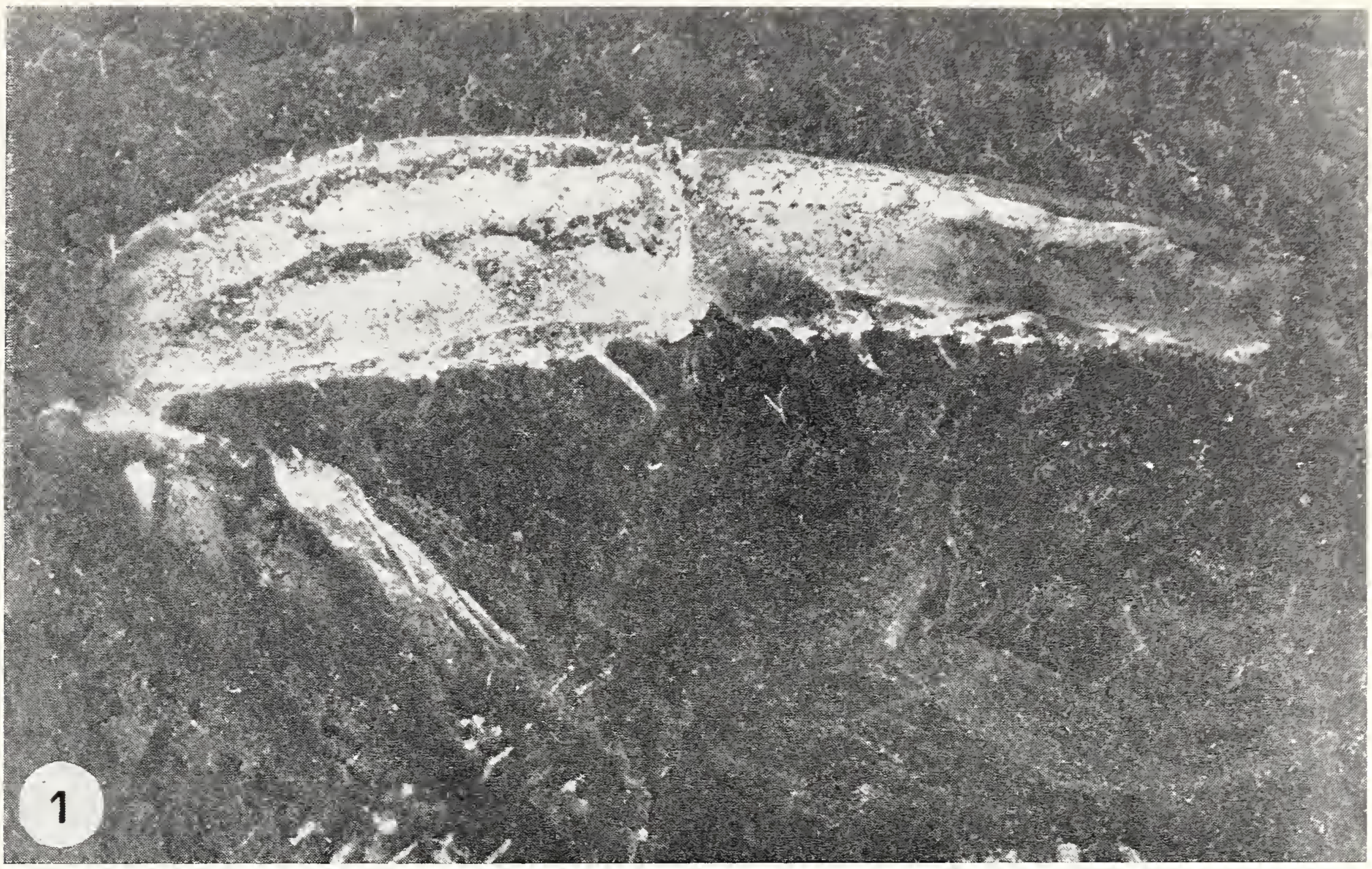


Fig. 1. — *Ostenia cypriformis*. Paratype, medium specimen with internal body partly exposed. N° cat. i 744 (× 1,8).

Fig. 2. — *Ostenia cypriformis*. Paratype, large specimen with appendages *in situ*. N° cat. i 742 (× 0,8).



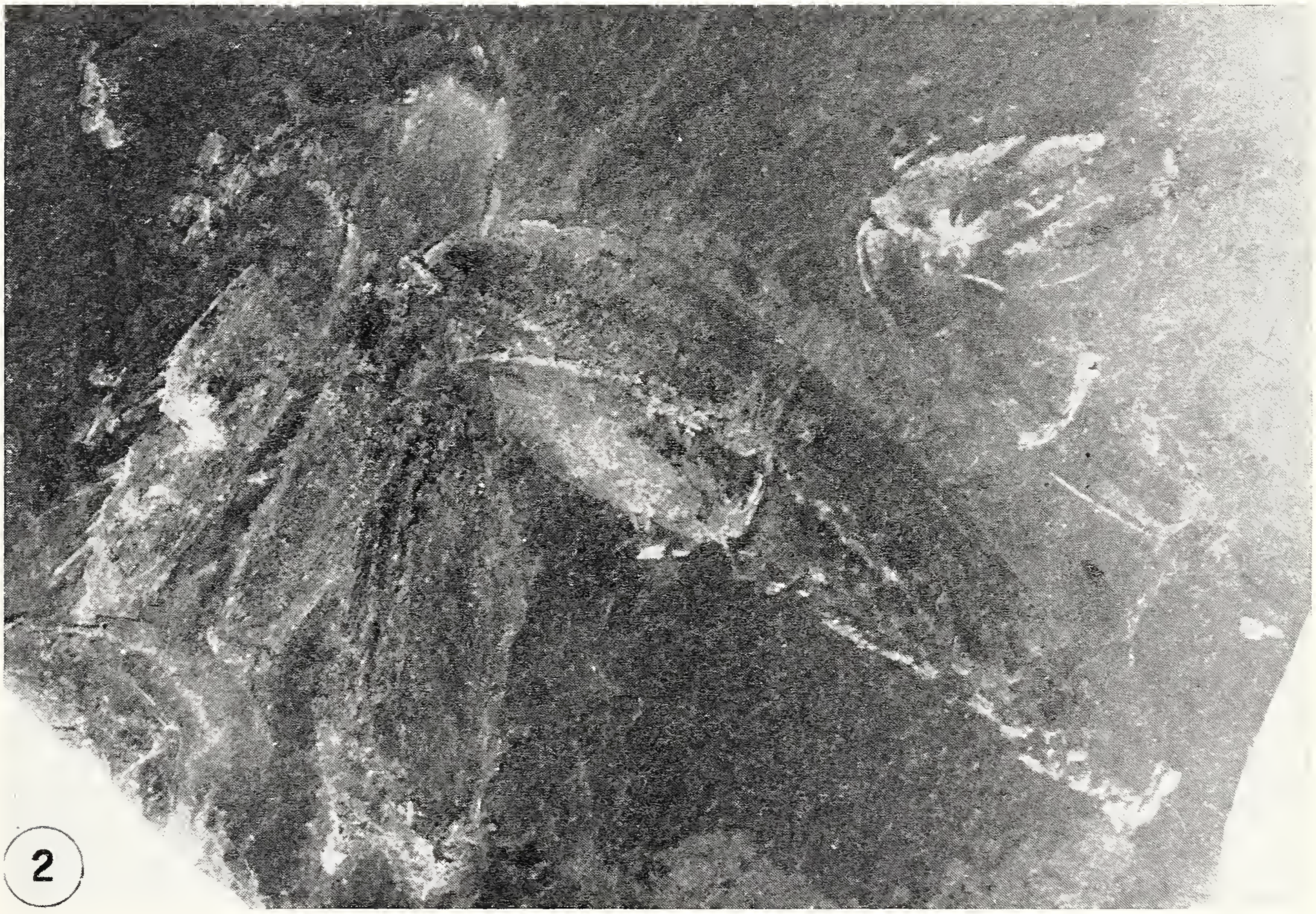
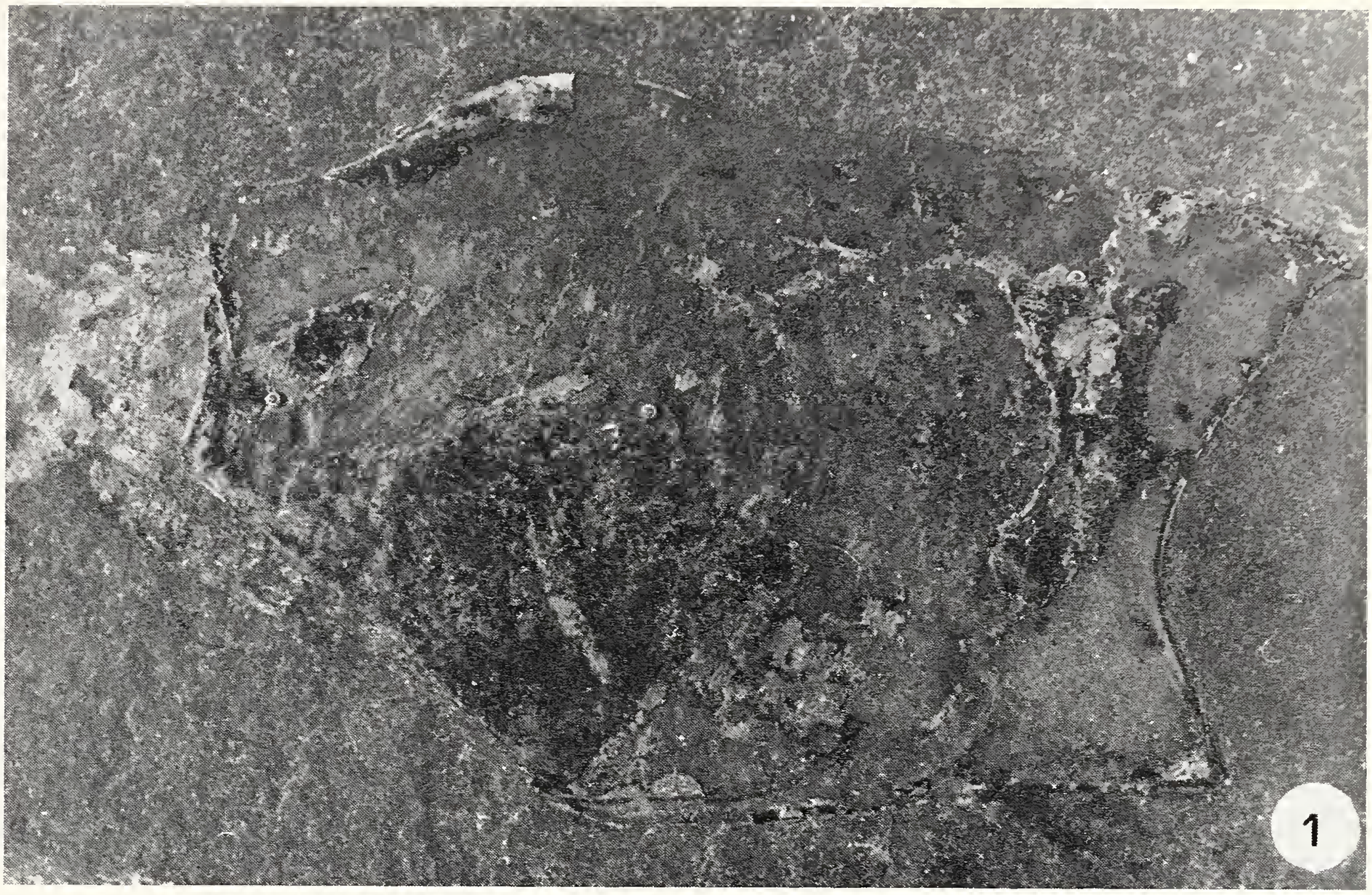


Fig. 1. — *Ostenia cypriformis*. Paratype, large articular first antenna. N° cat. i 745 (× 1,7).

Fig. 2. — *Ostenia cypriformis*. Paratype, group of articular cephalic appendages. N° cat. i 747 (× 0,9).



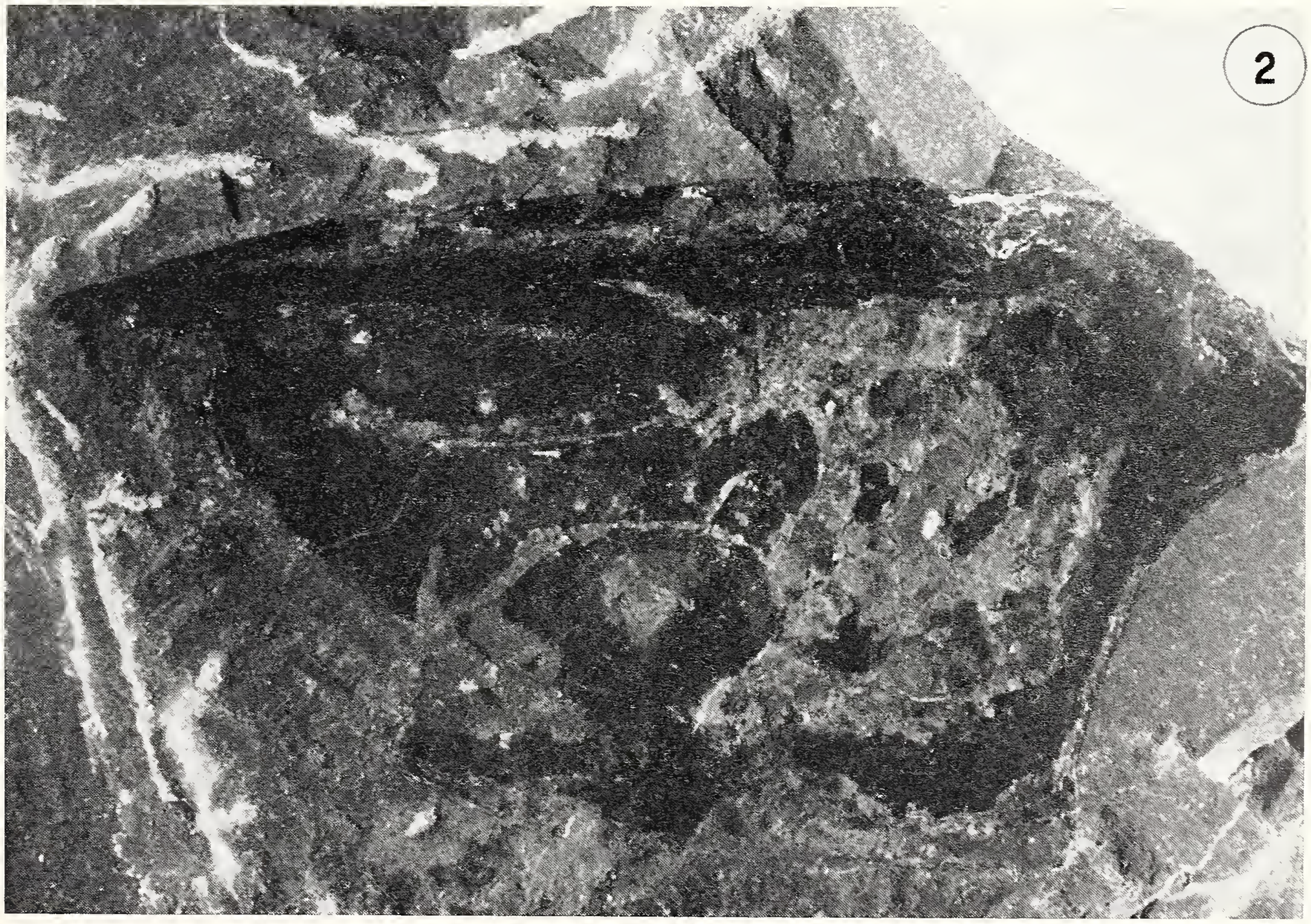
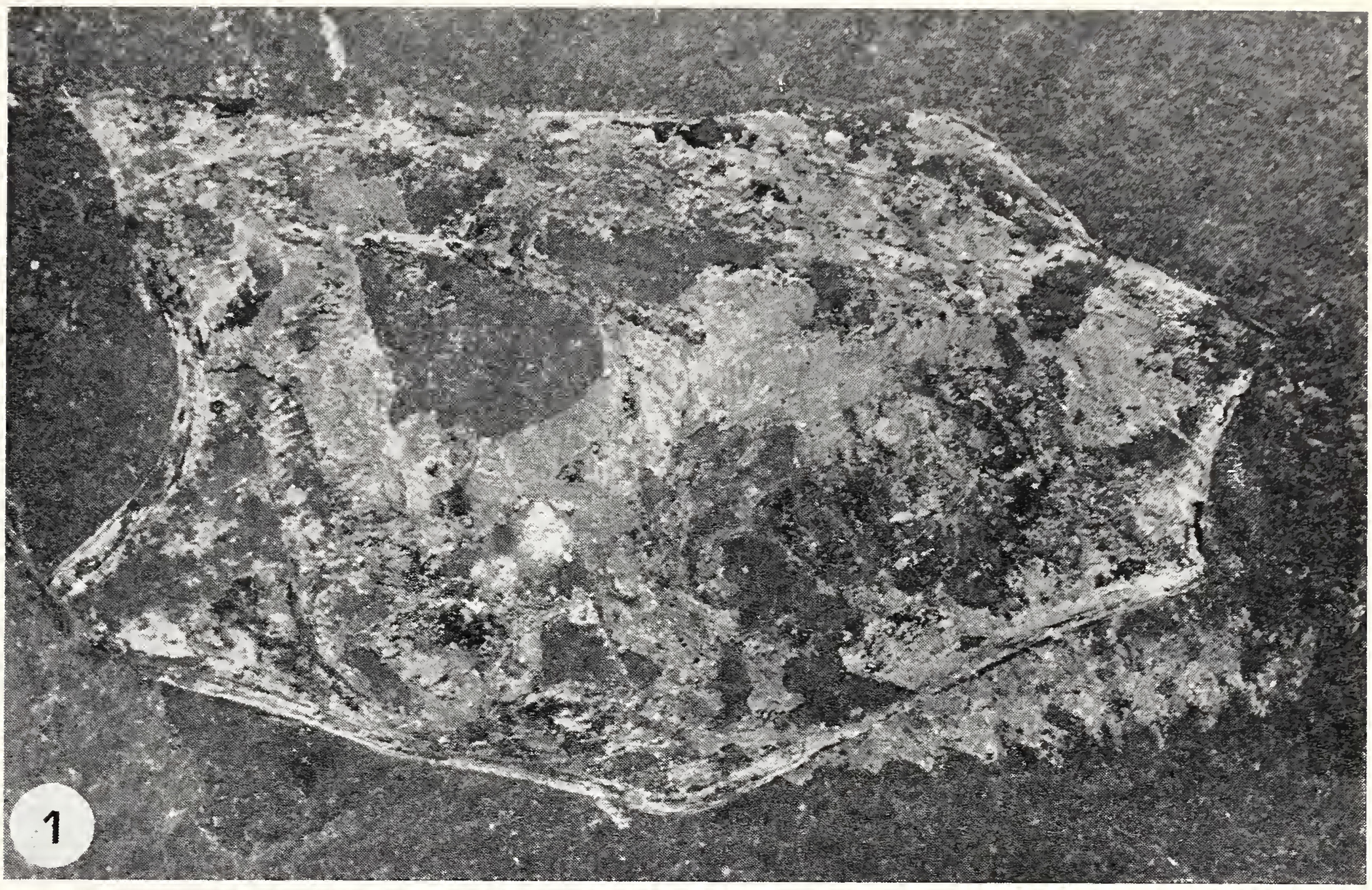


Fig. 1. — *Ostenia cypriformis.* Paratype. N° cat. i 749 (× 2).

Fig. 2. — *Ostenia cypriformis.* Paratype. N° cat. i 746 (× 2).



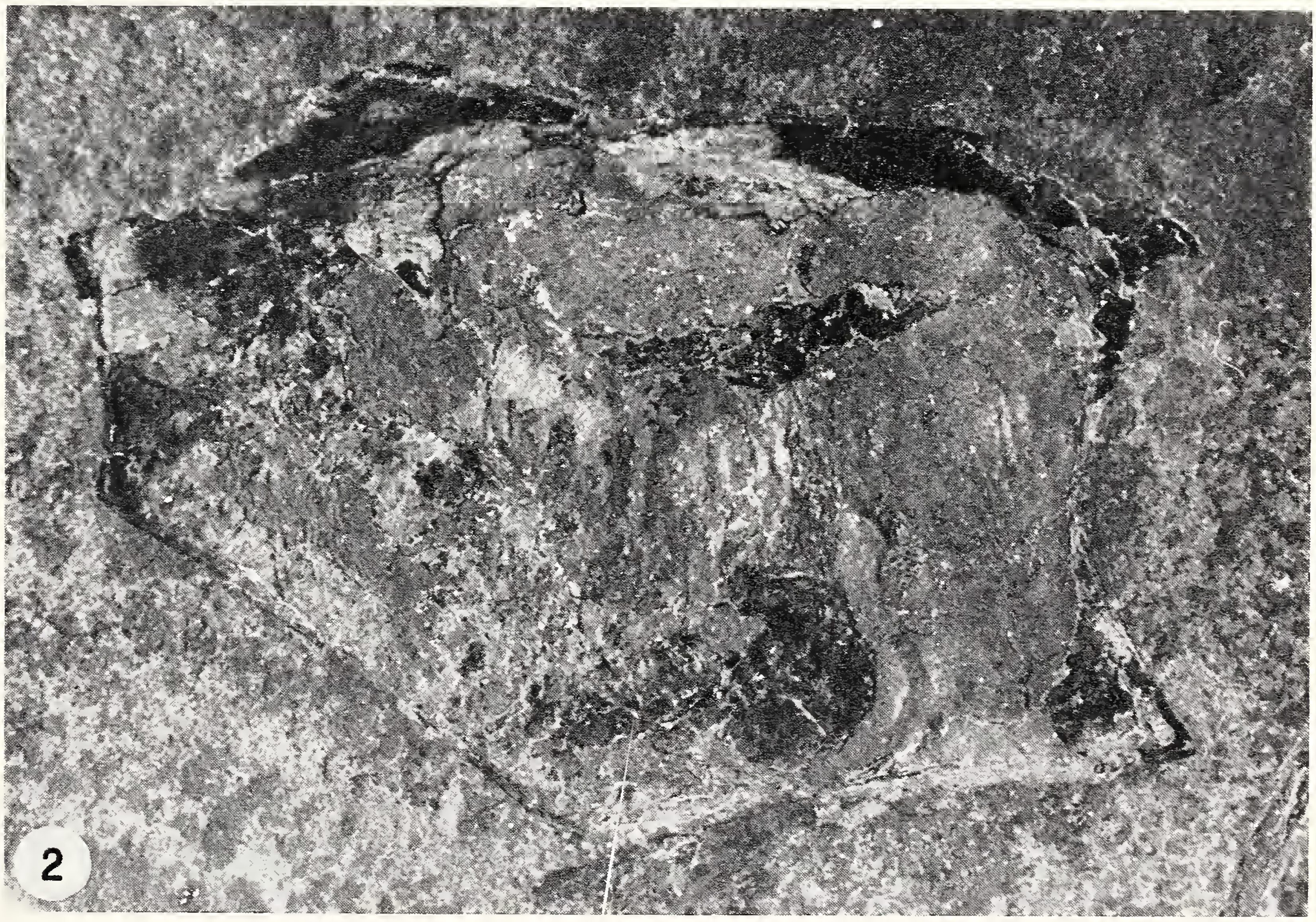


Fig. 1. — *Ostenia cypriformis*. Paratype. N° cat. i 743 (× 2,5).

Fig. 2. — *Ostenia cypriformis*. Paratype. N° cat. i 748 (× 3).